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THE ARMY REHABILITATION PROGRAM FOR THE BLIND AND THE DEAFENED

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U. S. ARMY

The rehabilitation of seriously handicapped military personnel becomes increasingly important as more and more of our troops engage in combat. Among the most formidable disabling conditions encountered in soldiers are blindness, deafness, amputations of the extremities, paralysis following nerve injuries, and facial disfigurement. In this paper I shall discuss only the Army program for rehabilitating personnel with loss of sight and impairment of hearing.

In Surgeon General's Office Circular Letter No. 162, issued last September, it was pointed out that the particular emotional problems of the newly blinded and deafened and their need for assistance in learning how to live without sight or hearing create a need for specialized rehabilitation.[1] A discussion of these disabilities will illustrate the Army's basic philosophy of management of handicapped military personnel.

Misinformation about blindness and deafness as a military problem is being circulated at this time. There have been rumors to the effect that many thousands of cases of deafness among servicemen may be anticipated as a result of this war, that every combat aviator may expect to suffer serious impairment of hearing, that there are thousands of war blinded and that a gigantic breeding program for dogs to guide blinded soldiers will be necessary to meet the demand. Fortunately, all of these rumors are untrue.

Let us review some facts and attempt to determine the extent of the problem of blindness in soldiers.

As a result of World War I,[2] France in 1922 had 2,200 blinded pensioners; Great Britain had slightly under 3,000. The United States Veterans Administration figures show about 300 pensioners with service connected visual loss. The American war blinded were cared for in General Hospital No. 7. Here, in a converted private estate on the outskirts of Baltimore, rehabilitation of the blind was started by teachers of braille and an experienced leader in recreation and handicraft. Of a total of 117 cases of blindness treated, 65 soldiers were totally blind and 52 had varying degrees of visual loss. High explosive shells, shrapnel and hand grenades caused 67 of these 117 cases of disability, and machine gun and rifle bullets caused 12.[3]

So far in the present world war the renowned St. Dunstan's agency for the care of the blind in Great Britain has known of 288 British servicemen and civilian casualties.

The United States Veterans Administration reported, as of January 1944, 99 veterans with varying degrees of blindness. Of the 86 discharged with blindnesss from the Army, 17 were totally blind.[4] As of the first o March, 73 cases of blindness were registered with the Office of the Surgeon General. There were, in addition, 2 blinded prisoners of war under treatment. Blindness is said to exist, by Army definition, when the best corrected vision is 20/200 in the better eye.

Of 42 patients admitted to one of the hospitals designated to care for the blind in this war, the reports show 17 cases of blindness due to wounds incurred in action, 18 cases due to injuries accidentally incurred and 7 cases due to disease. Six of the 17 battle casualties were caused by land mines or booby traps and 7 by shrapnel. Land mines caused 6 of the 18 accidental injuries, and dynamite blasts caused 5.[5] Si Ian Frazer has been quoted [2] as saying that in Worl War I two thirds of the cases of blindness were due t wounds caused by high explosive shells from which fragments of metal penetrated the eyes. In the present war he is reported to have found more blinded by concussion followed by hemorrhage. A detailed analysis of the American blinded has not yet been made.

Two hospitals, Dibble General Hospital, Menlo Park, Calif., and Valley Forge General Hospital, Phoenixville, Pa., have been especially equipped and staffed as ophthalmic centers. Here programs of social rehabilitation are initiated and carried out simultaneously with medical or surgical treatment that may be required. To insure that blinded soldiers shall have the benefi of the most expert care at all times, the War Department requires that each such casualty occurring in th United States or returned from overseas shall b reported to the Surgeon General, in whose office th case is then followed until medical and surgical treatment and social rehabilitation are completed and th patient is transferred to the Veterans Administratio for vocational training.

It is important to have specially trained personne contact the blinded soldier early in order to encourag the patient and keep him looking hopefully forward to the prospect of a full and useful life. A consultant, who has been blinded in this war and is well adjusted to his own handicap, is dispatched to the first hospital of residence of a newly blinded casualty in order to provide psychologic and emotional support. The blind consultant also arranges a temporary training program to bridge the period of time until the newly blinded soldier may be safely sent to one of the two special hospitals.

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[1] Rehabilitation of the Blind and the Hard of Hearing in Army Hospitals, Circular Letter No. 162, Office of the Surgeon General, Sept. 11, 1943.

[2] Farrell, G.: Help for the Blinded Soldier, Hygeia **22**: 259 (April) 1944.

[3] Barton, W. E., Major, M. C.: A Program for the Care of the Blind in World War II in Army Hospitals, Proc. Am. A. Workers for Blind, July 1943, pp. 51-55.

[4] Hines, Frank T., Brigadier General, U. S. Army: Personal communication to the Surgeon General of the Army, Jan. 26, 1944.

[5] Grear, J. N., Jr., Lieut. Col., M. C., Chief, Rehabilitation Se to Blind: Report to the Surgeon General.

At the hospital designated for the care of the blind, the soldier is taught how to dress and shave, and how to feed and care for himself. He is taught to use a typewriter, as this must now be a means of communication with his friends. He is taught how to write and how to tell the time of day with a braille watch. The Talking Book opens to him the world of literature, even before he learns to read braille. Radios, which are made available, offer much enjoyment. He is taught the braille method of reading and writing, and those who enjoy reading are encouraged to extend their study of braille. There teachers whose eyes have not been injured insure neatness of dress and good posture. Occupational therapists teach them to use their hands, to develop new perceptual skills and manual dexterity, and thus assist in restoring confidence through useful work. When the patient has learned to get about readily, he is encouraged to enlarge his social contacts, visit the city, go to concerts and get about in the world among his friends. The Red Cross makes an important contribution also in developing the family's understanding of the problems of the blind. The family is advised concerning how it may assist the patient and encourage him to develop self reliance.

The President's "Committee on Rehabilitative Measures to be carried on by the War and Navy Departments with respect to blinded service men" recently extended the responsibility of the Army beyond the customary period required for adequate medical and surgical treatment. Under this plan a center will be established adjacent to one of the special Army hospitals for the blind. Here blinded service personnel of the Army, Navy and Marine Corps will be given further training in social adjustment for an average period of from four to six months. During this time, aptitudes and interests will be explored and tested in prevocational training.

The Veterans Administration is charged by law with the vocational training of incapacitated discharged soldiers. To enable the blind promptly to become self supporting, the Veterans Administration will complete arrangements for such vocational training prior to their discharge from the service.

There is much interest in the matter of guide dogs, the public generally having the idea that every blinded person should have one. Experience shows, however, that only about 10 per cent of the blind can use dogs advantageously. Many blinded soldiers will develop the ability to get about with the minimum of assistance. With a skilfully used cane they are inconspicuous and unencumbered. Some individuals do not like dogs; others are temperamentally unfitted for canine companionship. It is important to have determined the type of work to be done and whether a guide dog will be practical and compatible with the future choice of a job. Even when the use of a dog is contemplated, it is better for the blinded individual first to develop his complementary senses to the fullest extent. The Veterans Administration and the Medical Department of the Army concur in the belief that a veteran should secure a guide dog only when it is shown that the dog is the best solution to the veteran's problem. Private guide dog agencies have agreed to provide dogs to blinded soldiers either gratis or at nominal cost. It appears that the facilities of these agencies will be adequate to meet all anticipated needs and that governmental aid in supplying dogs will not be required.

THE HARD OF HEARING

The problems involved in rehabilitating the hard of hearing do not differ greatly from those outlined for the care of the blind. The immediate objective, however, is different, for many of the hard of hearing patients, after adequate medical treatment, can be trained in speech and lip reading, fitted, in most cases, with a hearing aid, and then returned to limited duty in the military service.

In the first world war, 1 man in 5,000 was discharged for defective hearing.[6] The Veterans Administration on Oct. 28, 1943 had on the compensation or pension rolls 416 veterans of World War I who were totally deaf, and 12,397 who were partially deaf. Meningitis was the cause of 25 per cent of the hardness of hearing.[7]

The Statistical Division of the Surgeon General's Office estimated on Dec. 30, 1943 that the average annual admission rate to Army hospitals for deafness and defective hearing was approximately 1 in 1,000 per annum. This estimate was extended on Feb. 12, 1944 to predict a discharge rate for men with defective hearing of about 34 per hundred thousand annually (as compared with 20 per hundred thousand annually in World War I). On Jan. 1, 1944, 313 patients with defective hearing had been admitted to the three hospitals which have rehabilitation services for the deaf.

In a study of 102 cases of deafness[8] 54 were of perceptive deafness, 34 had mixed perceptive and conductive deafness, 4 had conductive deafness, 6 had otosclerosis and 4 were deaf because of other disorders.

In another series of 153 cases[9] defective hearing had existed prior to induction in 48 cases and was considered progressive and not aggravated by service, 21 cases of partial deafness resulted from the blast of high explosives during enemy action, 10 cases of partial deafness were due to heavy firing not acquired during combat and in 17 cases impairment of hearing existed prior to induction and was considered to have been aggravated by service.

While the rate of incidence of deafness seems increased, not as many cases have developed as might have been expected from the increased hazards in this war due to blast and noise. Persons with impaired hearing have not been received for rehabilitation from the Army Air Forces in greater proportion than from other branches of the service to date.

Three hospitals have been designated for special care of the deaf. These are the Deshon General Hospital, Butler, Pa., the Borden General Hospital, Chickasha, Okla., and the Hoff General Hospital, Santa Barbara, Calif.

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[6] Communication from Statistical Division, Office of the Surgeon General, Oct. 30, 1943.

[7] Communication from Office of Budget and Statistics, Veterans' Administration, Oct. 28, 1943.

[8] Barton, W. E., Major, M. C.: The Philosophy of Army Rehabilitation Program, read before the War Problems Conference of the National Association of Teachers of Speech, New York, Dec. 30, 1943.

[9] Mobley, M. R.: Annual Report of the Deshon General Hospital, Jan. 1, 1944.

In Circular No. 81, issued Feb. 23, 1944, the War Department directed that "every case in which the impairment of hearing shows a true loss in the better ear of 30 decibels of hearing within the conversational range (256-2,048 decibels), or a loss of 3/15 or below to whispered voice, when an audiometer is not available, in a case of stationary or progressive deafness free from acute inflammatory aural disease, will be transferred to a hospital designated for the rehabilitation of the deaf at the earliest practicable date.

"Hearing aids are furnished to personnel in active military service who are suffering from hearing defects that preclude the performance of military duty, regardless of line of duty status, when examination shows that such aids will materially improve the hearing of the individual concerned."[10]

The three hospital centers for the deaf previously mentioned are the only ones authorized to fit hearing aids. In each case the particular make or model of hearing aid is selected only after careful objective and subjective tests made by the Army's own acoustic experts. Individual ear molds are supplied in each case.

The rehabilitation service to the deafened provides training in residual hearing and lip reading. Experienced teachers give daily lessons to those who require such training. Group practice and movie film instruction have been found to shorten the learning time for lip reading. Most patients become able to read lips in from six to eight weeks. Speech teachers are also on duty in the three special hospitals to prevent deterioration in speech.

It is pointed out again that after periods of rehabilitation many of these men can be returned to military duty in specialized assignments. Those servicemen who are unfit for further military duty will be enabled to secure vocational training more easily and ultimately to obtain satisfactory positions in civil life. In partial summary it may be said that:

1. The number of cases of blindness in our Army in this war is still small, 73 having been recorded by March 1, 1944.

2. Two specially staffed and equipped ophthalmic hospitals receive all newly blinded casualties. A reporting system insures that all cases are found and transferred to these special hospitals for necessary medical and surgical care and initiation of social rehabilitation.

3. The Army is setting up a facility for the social rehabilitation of the blind, following necessary hospitalization, not only for its own, but also for the blind of the Navy and the Marine Corps. The program will provide for social adjustment, teaching of braille and prevocational training.

4. Deafness in World War II is increased over that in World War I on the basis of figures now available.

5. The Army rehabilitation program for the deaf includes (*a*) treatment of all deafened in three special hospital centers, (*b*) supplying properly fitted hearing aids to all who will benefit by their use and (*c*) offering instruction in residual hearing, lip reading and proper speech control.

6. Hard of hearing servicemen are salvageable for many types of specialized duty.

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[10] War Department Circular No. 81, Sect. 4, Feb. 23, 1944.

THE TREATMENT OF GONORRHEAL URETHRITIS

WITH SULFONAMIDES AND PENICILLIN COMBINED

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When penicillin became available at the U. S. Naval Hospital, Bainbridge, Md., in October 1943, a large number of patients with sulfonamide resistant gonorrheal urethritis were under treatment. Most of them had been treated for long periods, almost all for more than forty days, a fairly large number for more than sixty days, and one man had been on the sick list one hundred and twenty-eight days. Treatment had consisted in repeated courses of sulfathiazole and sulfadiazine (table 1), in most instances with the addition of standard types of local therapy. The penicillin sodium was procured from two nationally known pharmaceutical firms. At first the dosage recommended by Keefer and his associates,[1] 160,000 Oxford units at the rate of 10,000 units every three hours, was injected into the muscle. It soon became apparent, however, not only that penicillin was brilliantly efficacious but that its action was so rapid that in all the cases clinical and bacteriologic cure resulted within twenty-four hours. In many the urethral discharge and all symptoms ceased within nine hours. In the meantime Turner and Sternberg[2] suggested that 50,000 Oxford units would probably be efficacious in gonorrheal urethritis, although they predicted, apparently as the result of experience, that 10 to 20 per cent failures might be expected with such dosage. Those considerations, together with the limited availability of the drug and the need to conserve it, led us progressively to decrease the dosage, until finally a series of 73 sulfonamide resistant cases were treated with 50,000 Oxford units of penicillin each (table 1, group B). There was but 1 failure. As a result, however, of conversations with Dr. C. S. Keefer and with Capt. W. W. Hall of the Medical Corps, U. S. Navy, it was suspected that the striking success with 50,000 units obtained in that series might be more fortuitous than real. They pointed out that the assay of penicillin is as yet subject to such limitations that in using doses of 50,000 units the variation of actual dosage administered may range from as little as 30,000 units to as much as 70,000 units. Foster and Woodruff[3] have written of the limitations and

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. From the U. S. Naval Hospital, Bainbridge, Md.

The authors were assisted by Lieut. H. W. Savage (MC), U. S. N. R., and Ensign Elma Krumwiede, Women's Reserve, U. S. N. R.

Since this article was prepared the authors have treated 71 additional cases with combined sulfonamide-penicillin. The results were in all respects similar to those described and do not differ statistically from those of table 2.

[1] Keefer, C. S.; Blake, F. G.; Marshall, E. K., Jr.; Lockwood, J. S., and Wood, W. B., Jr.: Penicillin in the Treatment of Infections, J. A. M. A. **122:** 1217 (Aug. 28) 1943.

[2] Turner, T. B., and Sternberg, T. H.: Management of the Venereal Diseases in the Army, J. A. M. A. **124:** 133 (Jan. 15) 1944.

[3] Foster, J. W., and Woodruff, H. B.: Microbiological Aspects of Penicillin: I. Methods of Assay, J. Bact. **46:** 187 (Aug.) 1943; Improvements in the Cup Assay for Penicillin, J. Biol. Chem. **148:** 723 (June) 1943.

difficulties in performing accurate assay of penicillin. Moreover, a subsequent report from the Army[4] indicated that when 50,000 units of penicillin alone was used to treat sulfonamide resistant gonorrheal urethritis the failures were in excess of 15 per cent. In the meantime Rammelkamp and Keefer[5] had suggested that a combination of a sulfonamide compound with penicillin might prove more effective than either drug alone in staphylococcic infections. In their preliminary observations they had observed that "the addition of small amounts of penicillin, which in itself displays no killing effect against staphylococci, will enhance the antistaphylococcal effect of sulfathiazole in whole defibrinated blood." It was desirable, therefore, in view of these considerations to investigate the effect of a combination of sulfathiazole and small doses of penicillin on acute gonorrheal urethritis. Table 2 summarizes the results of that investigation.

METHODS

The criteria of diagnosis of gonorrheal urethritis were a history of exposure, when it could be obtained, the presence of a purulent urethral discharge and demonstration of Neisseria gonorrhoeae in smears. Criteria of cure were disappearance of symptoms and of urethral discharge, and failure to find and to culture Neisseria gonorrhoeae from material obtained by prostatic massage between the fourth and fifth days after the completion of treatment, and again between the tenth and fifteenth days. The culture medium employed was a beef extract agar base containing bactotryptose or neopeptone with 0.03 per cent dextrose and 5 per cent sodium chloride with 10 cc. of a 0.5 per cent solution of paraaminobenzoic acid added to each liter of medium.

The treatment of patients listed in table 1 consisted in the administration of penicillin as shown. The treatment of all patients listed in table 2 consisted in the following: On the first day 8 Gm. of sulfathiazole was given orally in four divided doses; on the second day 4 Gm. of sulfathiazole in divided doses was given with the concomitant administration of 50,000 Oxford units of penicillin at the rate of 10,000 units (5,000 units per cubic centimeter) every three hours in the muscle. Intramuscular injections at the rate of 10,000 units every three hours were used as a result of the studies of Rammelkamp and Keefer,[6] of Dawson, Meyer and Chaffee[7] and because our previous experience had indicated that that rate was highly efficacious.

Table 1.—*Patients with Sulfonamide Resistant Gonorrheal Urethritis Treated with Penicillin*

Patients	Total Penicillin Units	Concentration per Cc., Units	Units per Dose	Frequency
Group A*				
4	160,000	5,000	10,000	3 hours
17	150,000	5,000	10,000	3 hours
6	145,000	5,000	10,000	3 hours
1	140,000	5,000	10,000	3 hours
2	130,000	5,000	10,000	3 hours
34	100,000	5,000	20,000	3 hours
39	100,000	5,000	20,000	4 hours
3	80,000	5,000	20,000	4 hours
106				
Group B †				
69	50,000	5,000	10,000	2 hours
4	50,000	5,000	5,000	1 hour

* Average dose of sulfonamide prior to beginning penicillin, 52.3 Gm. ranging from 16 to 100 Gm.

† Average dose of sulfonamide prior to beginning penicillin, 24.7 Gm. ranging from 8 to 56 Gm.

Table 2.—*Patients with Gonorrheal Urethritis Treated with Sulfathiazole (12 Gm.) and Penicillin (50,000 Oxford Units) Combined*

	Cured	Failed	Total	Per Cent Failed
White				
Group A *	25	2	27	7.40
Group B †	39	4	43	9.30
Total white	64	6	70	8.57
Negro				
Group C ‡	112	2	114	1.75
Group D §	46	2	48	4.16
Total Negro	158	4	162	2.47
Total all cases	222	10	232	4.31

* White recruits.

† White men with acute untreated disease.

‡ Negro recruits.

§ Negro men with acute untreated disease.

The data from the study are presented in the accompanying tables. Our results with the use of penicillin in doses of 80,000 or more Oxford units in sulfonamide resistant gonorrheal urethritis are in accord with those obtained by others.[8] In almost all cases in which such doses were administered the symptoms and urethral discharge cleared and bacteriologic cure resulted within twenty-four hours or less. In a few a slight mucoid discharge persisted for a few days.

The results in sulfonamide resistant gonorrhea in patients who received only 50,000 units of penicillin (table 1, group B) were unexpected in that there were no failures. The series (73 cases) seems somewhat large to be accounted for by mere chance. Because, as already indicated, the error of the assay of penicillin may be considerable when dealing with small amounts, it might be supposed that the patients actually received considerably more than 50,000 units, but against such a supposition is the fact that several different batches of the drug obtained from two different pharmaceutical firms were used in treating those patients, and it is unlikely that an error would always have been in the same direction. Although the aforementioned factors may have played a role, we are of the opinion that the excellent results obtained with the combined drugs occurred because the drugs actually enchanced the efficacy of each other. Enhanced clinical effectiveness in the treatment of staphylococcic infections by using sulfonamide compounds and penicillin combined was predicted by Rammelkamp and Keefer[5] as a result

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[4] Hall, W. W., Capt., M. C. U. S. Navy: Personal communication to the authors.

[5] Rammelkamp, C. H., and Keefer, C. S.: Penicillin: Its Antibacterial Effect in Whole Blood and Serum for the Hemolytic Streptococcus and Staphylococcus Aureus, J. Clin. Investigation **22:** 425 (May) 1943.

[6] Rammelkamp, C. H., and Keefer, C. S.: Absorption, Excretion and Distribution of Penicillin, J. Clin. Investigation **22:** 425 (May) 1943.

[7] Dawson, M. H.; Hobby, G. L.; Meyer, K., and Chaffee, E.: Penicillin as a Chemotherapeutic Agent, Ann. Int. Med. **19:** 707 (Nov.) 1943.

[8] Herrell, W. E.; Cook, E. N., and Thompson, L.: Use of Penicillin in Sulfonamide Resistant Gonorrheal Infections, J. A. M. A. **122:** 289 (May 29) 1943. Mahoney, J. F.; Ferguson, C.; Buchholtz, M. S., and Van Slyke, C. J.: The Use of Penicillin Sodium in the Treatment of Sulfonamide Resistant Gonorrhea in Men, Am. J. Syph., Gonor. & Ven. Dis. **27:** 525 (Sept.) 1943. Robinson, J. N., cited in Penicillin, Foreign Letters (London), J. A. M. A. **124:** 117 (Jan. 8) 1944. Cook, E. N.; Pool, T. L., and Herrell, W. E.: Further Observations on Penicillin in Sulfonamide Resistant Gonorrhea, Proc. Staff Meet., Mayo Clin. **18:** 433 (Nov. 17) 1943. Dawson, M. H., and Hobby, G. L.: The Clinical Use of Penicillin: Observations in 100 Cases, J. A. M. A. **124:** 611 (March 4) 1944. Bloomfield, A. L.; Rantz, L. A., and Kirby, H. M. M.: The Clinical Use of Penicillin, ibid. **124:** 627 (March 4) 1944. Keefer, Blake, Marshall, Lockwood and Wood.[1]

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